

A

Oilgo #	Name	Primer Sequences (5'-3')
2663	mK1	TTG GTG CTG ATG TTC TGG
2664	mK2	ATC TTC TTG CTG TTC TGG
2665	mK3	TGG GTG CTG CTG CTC TGG
2666	mK4	GGG CTG CTT GTG CTC TGG
2667	mK5	GGA ATC TTG TTG CTC TGG
2668	mK6	RTR TTS CTG CTG CTR TGG
2669	mK7	GGT CTC CTG TTG CTC TGT
2670	mK8	ATA TTT CTA CTG CTC TGT
2671	mK9	GTC ATA ATR TCC AGA GGA

B

Oilgo #	Name	Primer Sequences (5'-3')
2672	mH1	CTG AGC TGT GTA TTC CT
2673	mH2	CTC ARM TTG ATT TTC CT
2674	mH3	TGG RTC ATS TTC TTC CT
2675	mH4	TKS RTC TTT CTC TTC CT
2676	mH5	TGT ATC ATS CTC TTC TT
2677	mH6	TGG RTC TTT CTC TTT TT
2678	mH7	TTA AAC TGG GTT TTT CT
2679	mH8	GKG CTG YTC YTC TGC CT
2680	mH9	TTA AGT CTT CTG TAC CTG
2730	MH11	TCAGTAACTGCAGGTGTCCA
2731	MH12	TTTTAAAAGGTGTCCAGTGT
2732	MH13	GCAACAGCTACAGGTGTCCA
2733	MH14	CAGCTACAG RT GTCCACTCC
2734	MH15	ATTTCCAAGCTGTGTCTGTCC
2735	MH16	CTCCTGTCAGGAACTGCAGGTGT
2736	MH17	CAGTGGTTACAGGGGTCAATTCA
2737	MH18	CTGTT S ACAGC CH TTCC K GGT
2738	MH19	CTGATGGCAGCTGCCCAAAGT
2739	MH20	TTTATCAAGGTGTGCATTGT

C

2650 5' TCACTGGATGGTGGGAAGATGGATACA 3'
2656 5' GACATTTGGGAAGGACTGACTCTC 3'
2706 5' CAG GGG GCT CTC GCA GGA GAC GAG 3'

FIGURE 1

HuIV-26 VL

GACATTGTGATGACACAGTCTCCATCTTTGTTGAGTGTGTCAGCAGGAGAGAAGGTCCT
ATGAGCTGCAAGTCCAGTCAGAGTCTGTTAAACAGTGGAAATCAAAGAAGTACTTGGCC
TGGTACCAGCAGAAACCAGGGCAGCCTCCTAAACTGTTGATCTATGGGGCATCCACTAGG
GAATCTGGGGTCCCTGATCGCTTCACAGGCAGTGGATCTGGAACCGATTTCACTCTTATC
ATCAGCAGTGTGCAGGCTGAAGACCTGGCAGTTTATTACTGTCAGAATGATCATAGTTAT
CCGTACACGTTTCGGAGGGGGGACCAAGCTGGAAATAAAA

FIGURE 2A

HuIV-26 VH

GAGGTGAAGCTTCTCGAGTCTGGAGGTGGCCTGGTGCAGCCTGGAGGATCCCTGAAACT
CTCCTGTGCAGCCTCAGGATTCGATTTTAGTAGATACTGGATGAGTTGGGTCCGGCAGG
CTCCAGGGAAAGGGCTAGAATGGATTGGAGAAATTAATCCAGATAGCAGTACGATAAAC
TATACGCCATCTCTAAAGGATAAATTCATCATCTCCAGAGACAACGCCAAAAATACGCT
GTACCTGCAAATGAGCAAAGTGAGATCTGAGGACACAGCCCTTTATTACTGTGCAAGAC
CGGTTGATGGTTACTACGATGCTATGGACTACTGGGGTCAAGGAACCTCAGTCACCGTC
TCCTCA

FIGURE 2B

[illegible]

VH Domain

FIGURE 2C

HUI77 VL sequence

GATGTTTTGATGACCCAACTCCACTCTCCCTGCCTGTCAGTCTTGGAGATCAAGCCTCC
ATCTCTTGCAGATCTAGTCAGAGCATTGTACATAGTAATGGAAACACCTATTTAGAATGG
TACCTGCAGAAACCAGGCCAGTCTCCAAAGCTCCTGATCTACAAAGTTTCCAACCGATTT
TCTGGTGTCCCAGACAGGTTCACTGGCAGTGGATCAGGGACAGATTTCACTCAAGATC
AGCAGAGTGGAGGCTGAGGATCTGGGAGTTTATTACTGCTTTCAAGGTTACATGTTCCG
TGGACGTTTCGGTGGAGGCACCAAGCTGGAAATCAAA

FIGURE 3A

HUI77 VH SEQUENCE

CAGGTTACTCTGAAAGAGACTGGCCCTGGGATATTGCAGCCCTCCCAGACCCTCAGTCTG
ACTTGTTCTTTCTCTGGGTTTTCACTGAGCACTTCTGGTATGGGTGTAGGCTGGATTTCGT
CAGCCTTCAGGAGAGGGTCTAGAGTGGCTGGCAGACATTTGGTGGGATGACAATAAGTAC
TATAACCCATCCCTGAAGAGCCGGCTCACAACTCCAAGGATACCTCCAGCAACCAGGTA
TTCCTCAAGATCACCAGTGTGGACACTGCAGATACTGCCACTTACTACTGTGCTCGAAGA
GCTAACTATGGTAACCCCTACTATGCTATGGACTACTGGGGTCAAGGAACCTCAGTCACC
GTCTCCTCA

FIGURE 3B

VK Domain

	1	10	20	30	40
HUI-77	D	V	L	M	T
VKII	D	V	L	M	T
	50	60	70	80	90
HUI-77	K	V	S	N	R
VKII/JK1	T	L	S	R	A

VH Domain

	1	10	20	30	40
HUI-77	Q	V	T	L	K
VHII	Q	V	T	L	K
	50	60	70	80	90
HUI-77	D	I	W	D	D
VHII	R	I	D	W	D
	100	110	120	130	140
HUI-77	R	A	N	Y	G
JH6	R	A	N	Y	G

FIGURE 3C

HUI77 VL sequence

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
HUI77 VL	GAT	GTT	TTG	ATG	ACC	CAA	ACT	CCA	CTC	TCC	CTG	CCT	GTC	AGT	CTT
DPK13	---	A--	G--	---	---	--G	---	---	---	---	---	--C	---	-CC	-C-
	CDR1														
	16	17	18	19	20	21	22	23	24	25	26	27	27a	27b	27c
HUI77 VL	GGA	GAT	CAA	GCC	TCC	ATC	TCT	TGC	AGA	TCT	AGT	CAG	AGC	ATT	GTA
DPK13	---	--G	-CG	---	---	---	--C	---	--G	---	---	---	---	C-C	T-G
	27d	27e	27f	28	29	30	31	32	33	34	35	36	37	38	39
HUI77 VL	CAT	AGT	...	AAT	GGA	AAC	ACC	TAT	TTA	GAA	TGG	TAC	CTG	CAG	AAA
DPK13	G--	---	GAT	G--	---	---	---	---	--G	--C	---	---	---	---	--G
	CDR2														
	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
HUI77 VL	CCA	GGC	CAG	TCT	CCA	AAG	CTC	CTG	ATC	TAC	AAA	GTT	TCC	AAC	CGA
DPK13	---	--G	---	---	---	C--	---	---	---	--T	-CG	C--	---	T-T	--G
	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
HUI77 VL	TTT	TCT	GGT	GTC	CCA	GAC	AGG	TTC	AGT	GGC	AGT	GGA	TCA	GGG	ACA
DPK13	GCC	---	--A	---	---	---	---	---	---	---	---	--G	---	--C	--T
	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
HUI77 VL	GAT	TTC	ACA	CTC	AAG	ATC	AGC	AGA	GTG	GAG	GCT	GAG	GAT	CTG	GGA
DPK13	---	---	---	--G	--A	---	---	--G	---	---	---	---	---	G-T	---
	CDR3														
	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
HUI77 VL	GTT	TAT	TAC	TGC	TTT	CAA	GGT	TCA	CAT	GTT	CCG	TGG	ACG	TTC	GGT
DPK13	---	---	---	---	A-G	---	---	---	---	---	---	---	---	---	--C
	100	101	102	103	104	105	106	107							
HUI77 VL	GGA	GGC	ACC	AAG	CTG	GAA	ATC	AAA							
JK1	CA-	--G	---	---	G--	---	---	---							

FIGURE 3D

HUIV26 LCDR3

IV26-l7.1 CTT GGT CCC CTG GCC AAA AGT GTA CGG ATA ACT ATG ATC ATT MNN ACA GTA ATA AAC TGC CAC ATC
IV26-l7.2 CTT GGT CCC CTG GCC AAA AGT GTA CGG ATA ACT ATG ATC MNN CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.3 CTT GGT CCC CTG GCC AAA AGT GTA CGG ATA ACT ATG MNN ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.4 CTT GGT CCC CTG GCC AAA AGT GTA CGG ATA ACT MNN ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.5 CTT GGT CCC CTG GCC AAA AGT GTA CGG ATA MNN ATG ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.6 CTT GGT CCC CTG GCC AAA AGT GTA CGG MNN ACT ATG ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.7 CTT GGT CCC CTG GCC AAA AGT GTA MNN ATA ACT ATG ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.8 CTT GGT CCC CTG GCC AAA AGT MNN CGG ATA ACT ATG ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC
IV26-l7.9 CTT GGT CCC CTG GCC AAA MNN GTA CGG ATA ACT ATG ATC ATT CTG ACA GTA ATA AAC TGC CAC ATC

HUIV26 HCDR3

IV26-h7.1 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATC GTA GTA ACC ATC AAC MNN TCT CGC ACA GTA ATA CAC
IV26-h7.2 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATC GTA GTA ACC ATC MNN CGG TCT CGC ACA GTA ATA CAC
IV26-h7.3 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATC GTA GTA ACC MNN AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.4 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATC GTA MNN ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.5 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATC GTA MNN ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.6 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC MNN GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.7 CGT GGT TCC TTG CCC CCA GTA GTC CAT MNN ATC GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.8 CGT GGT TCC TTG CCC CCA GTA GTC CAT MNN ATC GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.9 CGT GGT TCC TTG CCC CCA GTA GTC MNN AGC ATC GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.10 CGT GGT TCC TTG CCC CCA GTA MNN CAT AGC ATC GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC
IV26-h7.11 CGT GGT TCC TTG CCC CCA MNN GTC CAT AGC ATC GTA GTA ACC ATC AAC CGG TCT CGC ACA GTA ATA CAC

FIGURE 4A

HUIV26 LCDR1a

IV26L1-1 GTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGGCTGGAMNNGCAGTTGATGGTGGCCCT
IV26L1-2 GTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGGCTTMNCTTGCAGTTGATGGTGGCCCT
IV26L1-3 GTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGMNNGGACTTGCAGTTGATGGTGGCCCT
IV26L1-4 GTTCTTTTGGTTTCCGCWGTTTAACAGACTMNNGCTGGACTTGCAGTTGATGGTGGCCCT
IV26L1-5 GTTCTTTTGGTTTCCGCWGTTTAACAGMNNGCTGGCTGGACTTGCAGTTGATGGTGGCCCT
IV26L1-6 GTTCTTTTGGTTTCCGCWGTTTAAMNNACTCTGGCTGGACTTGCAGTTGATGGTGGCCCT
IV26L1-7 GTTCTTTTGGTTTCCGCWGTTMNNACTCTGGCTGGACTTGCAGTTGATGGTGGCCCT
IV26L1-8 GTTCTTTTGGTTTCCGCWMNNTAACAGACTCTGGCTGGACTTGCAGTTGATGGTGGCCCT

HUIV26 LCDR1b

IV26L1-9 TGGTTTCTGCTGGTACCAAGCTAAGTAGTTCTTTTGGTTTCCMNNGTTTAAACAGACTCTGGCT
IV26L1-10 TGGTTTCTGCTGGTACCAAGCTAAGTAGTTCTTTTGGTTMNNCGWGTTTAACAGACTCTGGCT
IV26L1-11 TGGTTTCTGCTGGTACCAAGCTAAGTAGTTCTTTTGMNNTCCGCWGTTTAACAGACTCTGGCT
IV26L1-12 TGGTTTCTGCTGGTACCAAGCTAAGTAGTTCTTMNNGTTTCCGCWGTTTAACAGACTCTGGCT
IV26L1-13 TGGTTTCTGCTGGTACCAAGCTAAGTAGTTMNNNTTGGTTTCCGCWGTTTAACAGACTCTGGCT
IV26L1-14 TGGTTTCTGCTGGTACCAAGCTAAGTAMNNTTTTGGTTTCCGCWGTTTAACAGACTCTGGCT
IV26L1-15 TGGTTTCTGCTGGTACCAAGCTAAMNNGTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGGCT
IV26L1-16 TGGTTTCTGCTGGTACCAAGCMNNGTAGTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGGCT
IV26L1-17 TGGTTTCTGCTGGTACAMNNTAAGTAGTTCTTTTGGTTTCCGCWGTTTAACAGACTCTGGCT

HUIV26 LCDR2

IV26L2-1 GAATCGGTACGGGACCCCGGATTCCCTGGTAGATGCMNNGTAAATGAGCAGCTTAGG
IV26L2-2 GAATCGGTACGGGACCCCGGATTCCCTGGTAGAMNCCCGTAAATGAGCAGCTTAGG
IV26L2-3 GAATCGGTACGGGACCCCGGATTCCCTGGTMNNTGCCCGTAAATGAGCAGCTTAGG
IV26L2-4 GAATCGGTACGGGACCCCGGATTCCCTMNNAGATGCCCGTAAATGAGCAGCTTAGG
IV26L2-5 GAATCGGTACGGGACCCCGGATTCCCTMNNNGTAGATGCCCGTAAATGAGCAGCTTAGG
IV26L2-6 GAATCGGTACGGGACCCCGGAMNNACTGGTAGATGCCCGTAAATGAGCAGCTTAGG
IV26L2-7 GAATCGGTACGGGACCCCMNNTTCCCTGGTAGATGCCCGTAAATGAGCAGCTTAGG

HUIV26 HCDR1

IV26H1-1 TGGAGCCTGGCGGACCCAGCTCATCCAATAMNNACTAAAGGTGAATCCAGA
IV26H1-2 TGGAGCCTGGCGGACCCAGCTCATCCAMNNTCTACTAAAGGTGAATCCAGA
IV26H1-3 TGGAGCCTGGCGGACCCAGCTCATMNNATATCTACTAAAGGTGAATCCAGA
IV26H1-4 TGGAGCCTGGCGGACCCAGCTMNNCCAATATCTACTAAAGGTGAATCCAGA
IV26H1-5 TGGAGCCTGGCGGACCCAMNNACTCCAATATCTACTAAAGGTGAATCCAGA

HUIV26 HCDR2a

IV26H2-1 TAGAGATGGCGTATAGTTTATCGTACTGCTATCTGGATTATMNNGCCAAYCCACTCCAGCCCTTTC
IV26H2-2 TAGAGATGGCGTATAGTTTATCGTACTGCTATCTGGATTMNNNTCGCCAAAYCCACTCCAGCCCTTTC
IV26H2-3 TAGAGATGGCGTATAGTTTATCGTACTGCTATCTGGMNNTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-4 TAGAGATGGCGTATAGTTTATCGTACTGCTATCMNNATTTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-5 TAGAGATGGCGTATAGTTTATCGTACTGCTMNNNTGGATTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-6 TAGAGATGGCGTATAGTTTATCGTACTMNNATCTGGATTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-7 TAGAGATGGCGTATAGTTTATCGTMNNGCTATCTGGATTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-8 TAGAGATGGCGTATAGTTTATMNNACTGCTATCTGGATTATTTGCCAAAYCCACTCCAGCCCTTTC
IV26H2-9 TAGAGATGGCGTATAGTTMNNCGTACTGCTATCTGGATTATTTGCCAAAYCCACTCCAGCCCTTTC

HUIV26 HCDR2b

IV26H2-10 CGTTGTCTCTGGAGATGRTGAATYTATCCTTTAGAGATGGCGTATAMNNTATCGTACTGCTATCTGG
IV26H2-11 CGTTGTCTCTGGAGATGRTGAATYTATCCTTTAGAGATGGCGTMNNGTTTATCGTACTGCTATCTGG
IV26H2-12 CGTTGTCTCTGGAGATGRTGAATYTATCCTTTAGAGATGGMNNTATAGTTTATCGTACTGCTATCTGG
IV26H2-13 CGTTGTCTCTGGAGATGRTGAATYTATCCTTTAGAGAMNNGTATAGTTTATCGTACTGCTATCTGG
IV26H2-14 CGTTGTCTCTGGAGATGRTGAATYTATCCTTTAGMNNNTGGCGTATAGTTTATCGTACTGCTATCTGG
IV26H2-15 CGTTGTCTCTGGAGATGRTGAATYTATCCTTMNNAGATGGCGTATAGTTTATCGTACTGCTATCTGG
IV26H2-16 CGTTGTCTCTGGAGATGRTGAATYTATCMNNTAGAGATGGCGTATAGTTTATCGTACTGCTATCTGG
IV26H2-17 CGTTGTCTCTGGAGATGRTGAATYTAMNNTTTAGAGATGGCGTATAGTTTATCGTACTGCTATCTGG

FIGURE 4B

Beneficial Mutations for HuIV-26 Antibody

CDRs	H1			H2				H3			L1					L2	L3	
Kabat Number	31	34	35	57	62	64	65	97	98	102	27	27d	27e	27f	29		93	94
HuIV-26	R	M	S	I	S	K	D	D	G	Y	Q	N	S	G	Q		S	Y
Mutations	H	I	T	A	Y	Q	S	P	P	P	R	S	Y	Y	K		Q	N
			A	S	A			G	A	N	S		W	R			G	S
			G		H			T	H				H	H			L	P
					G			A					R	I			A	M
																	T	
																	V	/

FIGURE 4C

HUI77 LCDR3

I77-l7.1 CTT GGT GCC CTG GCC GAA CGT CCA CGG AAC ATG TGA ACC TTG MNN GCA GTA ATA AAC TCC AAC ATC
I77-l7.2 CTT GGT GCC CTG GCC GAA CGT CCA CGG AAC ATG TGA ACC MNN AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.3 CTT GGT GCC CTG GCC GAA CGT CCA CGG AAC ATG TGA MNN TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.4 CTT GGT GCC CTG GCC GAA CGT CCA CGG AAC ATG MNN ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.5 CTT GGT GCC CTG GCC GAA CGT CCA CGG AAC MNN TGA ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.6 CTT GGT GCC CTG GCC GAA CGT CCA CGG MNN ATG TGA ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.7 CTT GGT GCC CTG GCC GAA CGT CCA MNN AAC ATG TGA ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.8 CTT GGT GCC CTG GCC GAA CGT MNN CGG AAC ATG TGA ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC
I77-l7.9 CTT GGT GCC CTG GCC GAA MNN CCA CGG AAC ATG TGA ACC TTG AAA GCA GTA ATA AAC TCC AAC ATC

HUI77 HCDR3

I77-h7.1 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG GTT ACC ATA GTT AGC MNN TCG AGC ACA GTA ATA CGT
I77-h7.2 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG GTT ACC ATA GTT MNN TCT TCG AGC ACA GTA ATA CGT
I77-h7.3 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG GTT ACC ATA MNN AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.4 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG GTT ACC MNN GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.5 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG GTT MNN ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.6 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA GGG MNN ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.7 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA GTA MNN GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.8 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC ATA MNN GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.9 CGT GGT TCC TTG CCC CCA GTA GTC CAT AGC MNN GTA GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.10 CGT GGT TCC TTG CCC CCA GTA GTC CAT MNN ATA GTA GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.11 CGT GGT TCC TTG CCC CCA GTA GTC MNN AGC ATA GTA GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.12 CGT GGT TCC TTG CCC CCA GTA MNN CAT AGC ATA GTA GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT
I77-h7.13 CGT GGT TCC TTG CCC CCA MNN GTC CAT AGC ATA GTA GGG GTT ACC ATA GTT AGC TCT TCG AGC ACA GTA ATA CGT

FIGURE 5A

HUI77 LCDR1a

```

3000   ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT AGA MNN GCA GGA GAT GGA GGC C
3001   ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT MNN CCT GCA GGA GAT GGA GGC C
3002   ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG MNN AGA CCT GCA GGA GAT GGA GGC C
3003   ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT MNN ACT AGA CCT GCA GGA GAT GGA GGC C
3004   ATA GGT GTT TCC ATT ACT ATG TAC AAT MNN CTG ACT AGA CCT GCA GGA GAT GGA GGC C
3005   ATA GGT GTT TCC ATT ACT ATG TAC MNN GCT CTG ACT AGA CCT GCA GGA GAT GGA GGC C
3006   ATA GGT GTT TCC ATT ACT ATG MNN AAT GCT CTG ACT AGA CCT GCA GGA GAT GGA GGC C
3007   ATA GGT GTT TCC ATT ACT MNN TAC AAT GCT CTG ACT AGA CCT GCA GGA GAT GGA GGC C

```

HUI77 LCDR1b

```

3008   TGG CTT CTG CAG GTA CCA TTC CAA ATA GGT GTT TCC ATT MNN ATG TAC AAT GCT CTG ACT
3009   TGG CTT CTG CAG GTA CCA TTC CAA ATA GGT GTT TCC MNN ACT ATG TAC AAT GCT CTG ACT
3010   TGG CTT CTG CAG GTA CCA TTC CAA ATA GGT GTT MNN ATT ACT ATG TAC AAT GCT CTG ACT
3011   TGG CTT CTG CAG GTA CCA TTC CAA ATA GGT MNN TCC ATT ACT ATG TAC AAT GCT CTG ACT
3012   TGG CTT CTG CAG GTA CCA TTC CAA ATA MNN GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT
3013   TGG CTT CTG CAG GTA CCA TTC CAA MNN GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT
3014   TGG CTT CTG CAG GTA CCA TTC MNN ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT
3015   TGG CTT CTG CAG GTA CCA MNN CAA ATA GGT GTT TCC ATT ACT ATG TAC AAT GCT CTG ACT

```

HUI77 LCDR2

```

3016   GAA CCT GTC TGG GAC TCC AGA AAA CCG GTT GGA AAC MNN ATA GAT CAG GAG CTG TGG
3017   GAA CCT GTC TGG GAC TCC AGA AAA CCG GTT GGA MNN TTT ATA GAT CAG GAG CTG TGG
3018   GAA CCT GTC TGG GAC TCC AGA AAA CCG GTT MNN AAC TTT ATA GAT CAG GAG CTG TGG
3019   GAA CCT GTC TGG GAC TCC AGA AAA CCG MNN GGA AAC TTT ATA GAT CAG GAG CTG TGG
3020   GAA CCT GTC TGG GAC TCC AGA AAA MNN GTT GGA AAC TTT ATA GAT CAG GAG CTG TGG
3021   GAA CCT GTC TGG GAC TCC AGA MNN CCG GTT GGA AAC TTT ATA GAT CAG GAG CTG TGG
3022   GAA CCT GTC TGG GAC TCC MNN AAA CCG GTT GGA AAC TTT ATA GAT CAG GAG CTG TGG

```

HUI77 HCDR1

```

3023   TGG GGG CTG ACG GAT CCA GCC CAC ACC CAT TCC AGA MNN GCT GAG TGA GAA CCC AGA
3024   TGG GGG CTG ACG GAT CCA GCC CAC ACC CAT TCC MNN AGT GCT GAG TGA GAA CCC AGA
3025   TGG GGG CTG ACG GAT CCA GCC CAC ACC CAT MNN AGA AGT GCT GAG TGA GAA CCC AGA
3026   TGG GGG CTG ACG GAT CCA GCC CAC ACC MNN TCC AGA AGT GCT GAG TGA GAA CCC AGA
3027   TGG GGG CTG ACG GAT CCA GCC CAC MNN CAT TCC AGA AGT GCT GAG TGA GAA CCC AGA
3028   TGG GGG CTG ACG GAT CCA GCC MNN ACC CAT TCC AGA AGT GCT GAG TGA GAA CCC AGA
3029   TGG GGG CTG ACG GAT CCA MNN CAC ACC CAT TCC AGA AGT GCT GAG TGA GAA CCC AGA

```

HUI77 HCDR2a

```

3038   CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA AAT MNN TGC AAG CCA CTC CAG GGC
3039   CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA MNN GTC TGC AAG CCA CTC CAG GGC
3040   CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA MNN AAT GTC TGC AAG CCA CTC CAG GGC
3041   CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC MNN CCA AAT GTC TGC AAG CCA CTC CAG GGC
3042   CAG AGA TGG GTT GTA GTA TTT ATT GTC MNN CCA CCA AAT GTC TGC AAG CCA CTC CAG GGC
3043   CAG AGA TGG GTT GTA GTA TTT ATT MNN ATC CCA CCA AAT GTC TGC AAG CCA CTC CAG GGC
3044   CAG AGA TGG GTT GTA GTA TTT MNN GTC ATC CCA CCA AAT GTC TGC AAG CCA CTC CAG GGC
3045   CAG AGA TGG GTT GTA GTA MNN ATT GTC ATC CCA CCA AAT GTC TGC AAG CCA CTC CAG GGC

```

HUI77 HCDR2b

```

3030   CTT GGA GAT GGT GAG CCT GCT CTT CAG AGA TGG GTT GTA MNN TTT ATT GTC ATC CCA CCA
3031   CTT GGA GAT GGT GAG CCT GCT CTT CAG AGA TGG GTT MNN GTA TTT ATT GTC ATC CCA CCA
3032   CTT GGA GAT GGT GAG CCT GCT CTT CAG AGA TGG MNN GTA GTA TTT ATT GTC ATC CCA CCA
3033   CTT GGA GAT GGT GAG CCT GCT CTT CAG AGA MNN GTT GTA GTA TTT ATT GTC ATC CCA CCA
3034   CTT GGA GAT GGT GAG CCT GCT CTT CAG MNN TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA
3035   CTT GGA GAT GGT GAG CCT GCT CTT MNN AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA
3036   CTT GGA GAT GGT GAG CCT GCT MNN CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA
3037   CTT GGA GAT GGT GAG CCT MNN CTT CAG AGA TGG GTT GTA GTA TTT ATT GTC ATC CCA CCA

```

FIGURE 5B

Beneficial Mutations for H₁L-77 Antibody

CDRs	H1	H2	H3	L1	L2	L3
Kabat Number	32 35b	59 64	95 100 100e 102	27c 27d 27e 28 30 33	50 51 53 54 56	89 90 91 92 93 94 97
H ₁ -77	S G	Y K	R N M Y	V H S N N L	K V N R S	F Q G S H V T
Mutations	P W W L A	S P A P	P Q K Q W N T M H L T V	P L W Y Y F V W S	S A S L W F	V R S W L T A H W E T S H K I

FIGURE 5C

Beneficial mutations chosen for combinatorial library

CDRs	H1	H2	H3	L1	L3	SPEkon	SPEkoff
Kabat Number	35	57 62	102	27d 27e 27f	93	O.D.560	O.D.560
wild type	S	I S	Y	N S G	S		
HuIV-26	S	I S	Y	N S G	S		
Mutations	T A	A Y A H	P	S Y Y W R H H R	Q		

Beneficial mutants

4.1-2D4	S	I S	P	N S G	Q		
L1b-F11	S	I S	P	N S Y	Q	0.745	0.483
H2a-G8	S	A S	P	N S G	Q	0.397	0.159
2D4H1-C3	A	I S	P	N S G	Q		
DcomA4	S	A Y	P	N Y Y	Q	0.981	0.769
DcomB1	A	A Y	P	N Y H	Q	1.018	0.714
DcomE1						1.031	0.758
DcomH2						1.07	0.705
DcomD2	S	A S	P	N R Y	Q	1.104	0.729
DcomD3	T	A Y	P	N S Y	Q	1.035	0.736
DcomD6	S	A Y	P	N W Y	Q	1.102	0.753
DcomA11						1.003	0.786
DcomE3	T	A Y	P	N R Y	Q	0.991	0.754
DcomG2	A	A Y	P	N R Y	Q	1.161	0.856
DcomA7	T	V S	P	N Y Y	Q	0.986	0.77
DcomB8	T	A A	P	N W Y	Q	0.998	0.807
DcomA2						1.026	0.74
DcomB10	T	A H	P	N W Y	Q	0.87	0.735
DcomC8	S	A A	P	N W Y	Q	0.978	0.763
DcomD7	T	A Y	P	N W Y	Q	1.083	0.794
DhuG5							
DhuH8							
DcomD11	A	A A	P	N W H	Q	1.125	0.752
DcomE11	A	A H	P	N W H	Q	0.973	0.732

Primers for combinatorial mutation

dH5762 TCTCTGGAGATGGTGAATTTACGTAAGTCTGCTATCTGGATT
dL27def CTAAGTAGTTCTTTTGGTTGTTATAACAGACTCTGGCTGGA
H1-35 TGGAGCCTGGCGGACCCAGGHCATCCAATATCTACTAAAGGTGAATCCAGA
H2-5762a TCTCTGGAGATGGTGAATCTATCCTTTAGGGM TGGCGTATAGTTGGCCGTAAGTCTGCTATCTGGATT
H2-5762b TCTCTGGAGATGGTGAATCTATCCTTTAGGTRTGGCGTATAGTTGGCCGTAAGTCTGCTATCTGGATT
L1-27def1 CTAAGTAGTTCTTTTGGTTGTRGTRGYTTAACAGACTCTGGCTGGA
L1-27def2 CTAAGTAGTTCTTTTGGTTGCSGTRGYTTAACAGACTCTGGCTGGA
L1-27def3 CTAAGTAGTTCTTTTGGTTGTRGCKGYTTAACAGACTCTGGCTGGA
L1-27def4 CTAAGTAGTTCTTTTGGTTGCSGCKGYTTAACAGACTCTGGCTGGA
L1-27def5 CTAAGTAGTTCTTTTGGTTGTRCCAGYTTAACAGACTCTGGCTGGA
L1-27def6 CTAAGTAGTTCTTTTGGTTGCSGCCAGYTTAACAGACTCTGGCTGGA

FIGURE 6

Beneficial mutations chosen for combinatorial library

CDRs	H1	H2	H3	L1	L3	Screen	Screen
Kabat Number	32 35b	59	100e	27d 28 33	91 94	kon	koff
wild type	S G	Y	M	H N L	G V		
Hu1-77	S G	Y	M	H N L	V		
Mutations	P W L A	S A P	Q	L Y F S W	S		

Beneficial combinatorial mutants

Qh2b-B7	S G	A	Q	H N L	S		
QH2b-A3	S G	S	Q	H N L			
Qcom1B6	P W	S	Q	S W L	S	1.319	0.534
Qcom1B8	P W	S	Q	S Y L	S	1.266	0.497
Qcom1E7						1.247	0.46
Qcom1G10						1.282	0.452
Qcom2G2						1.304	0.402
Qcom1C3	P W	A	Q	S W L	S	1.342	0.535
Qcom2A2						1.605	0.647
Qcom1G3						1.274	0.464
Qcom1D3	P W	T	Q	S W L	S	1.647	0.984
QhuD9							
QhuD93							
Qcom1E3	P W	A	Q	S Q L	S	1.225	0.347
Qcom2F6						1.311	0.321
Qcom1H6	P W	S	Q	S Q L	S	1.295	0.323
Qcom1H7	P W	A	Q	H Q F	S F	1.634	1.08
Qcom2A4	P A	A	Q	S Y L	S	1.304	0.265
Qcom2B11	P W	A	Q	H Y L	S	1.11	0.221
Qcom2C1	P W	Y	Q	S W F	S	1.189	0.213
Qcom2D9	P W	S	Q	H W L	S	1.101	0.209
Qcom2E3	P W	A	Q	H W L	S	1.117	0.248

Primers for combinatorial mutation

dL274-33 CTT CTG CAG GTA CCA TTC GTTA TAC AAT GCT CTG ACT AGA

H1-35b1 TGG GGG CTG ACG GAT CCA CMA CAC ACC CAT TCC AGR AGT GCT GAG TGA GAA CCC AGA

H1-35b2 TGG GGG CTG ACG GAT CCA GSC CAC ACC CAT TCC AGR AGT GCT GAG TGA GAA CCC AGA

H2-59 GCT CTT CAG AGA TGG GTT AGV GTA TTT ATT GTC ATC CCA C

L27d1 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC CCA ACT CRA TAC AAT GCT CTG ACT AGA

L27d2 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC GTA ACT CRA TAC AAT GCT CTG ACT AGA

L27d3 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC CTG ACT CRA TAC AAT GCT CTG ACT AGA

L27d4 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC CCA ACT GTG TAC AAT GCT CTG ACT AGA

L27d5 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC GTA ACT GTG TAC AAT GCT CTG ACT AGA

L27d6 CTT CTG CAG GTA CCA TTC MAA ATA GGT GTT TCC CTG ACT GTG TAC AAT GCT CTG ACT AGA

FIGURE 7

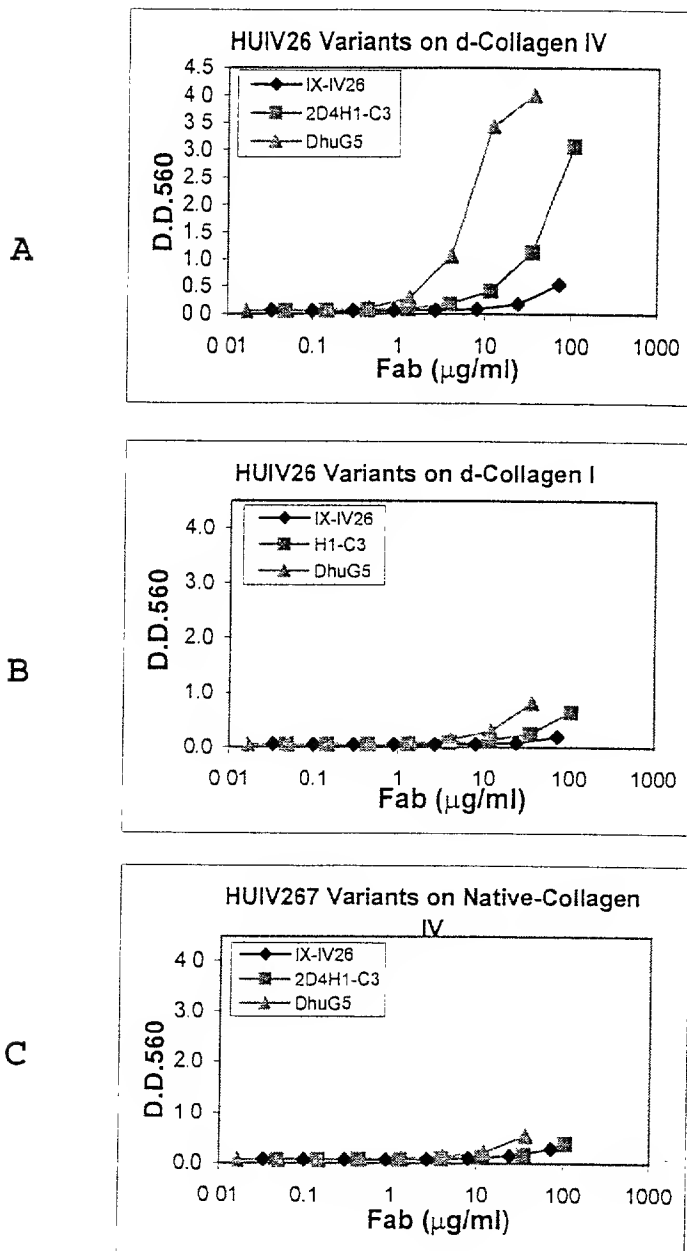
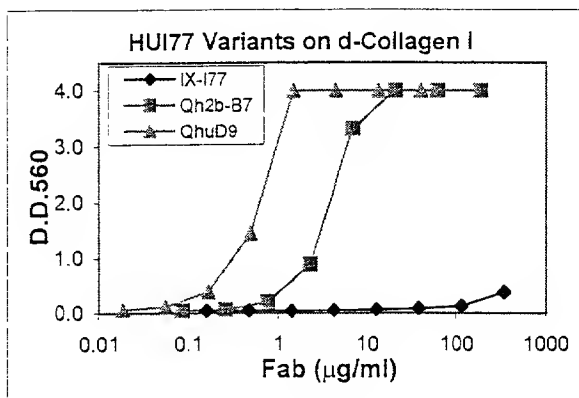
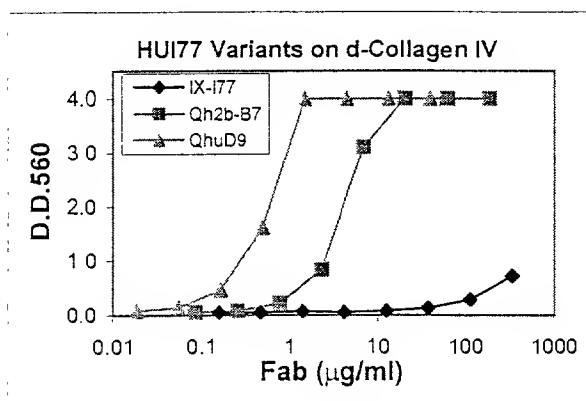


FIGURE 8

A



B



C

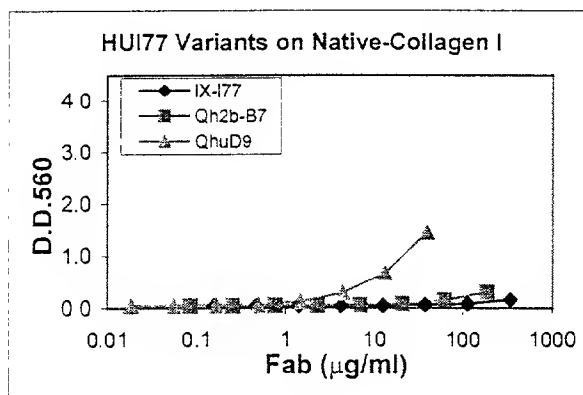


FIGURE 9

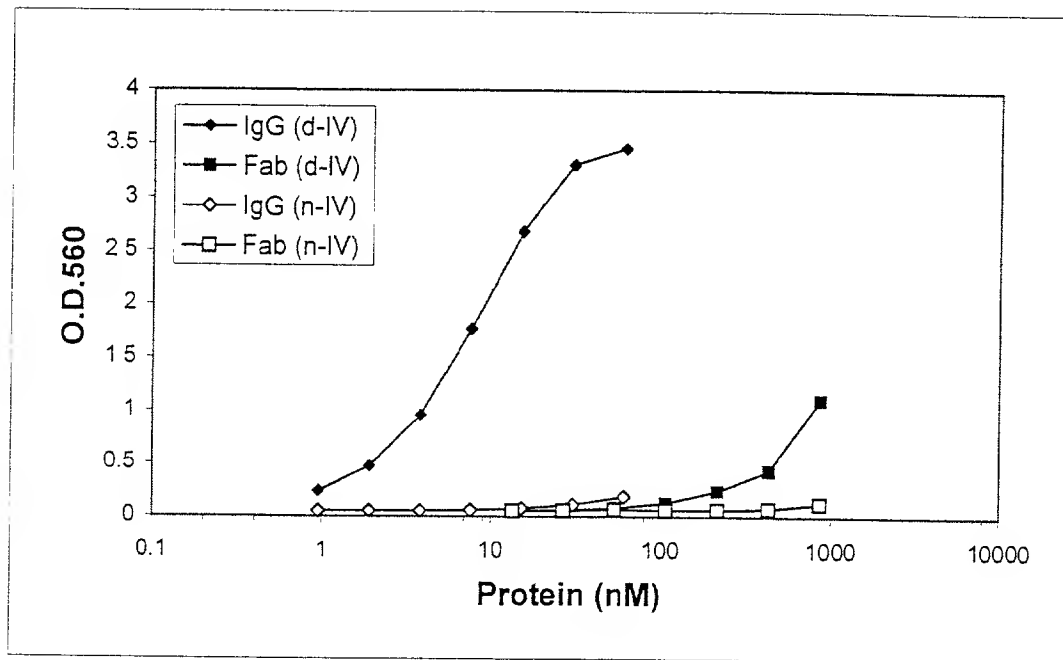


FIGURE 10

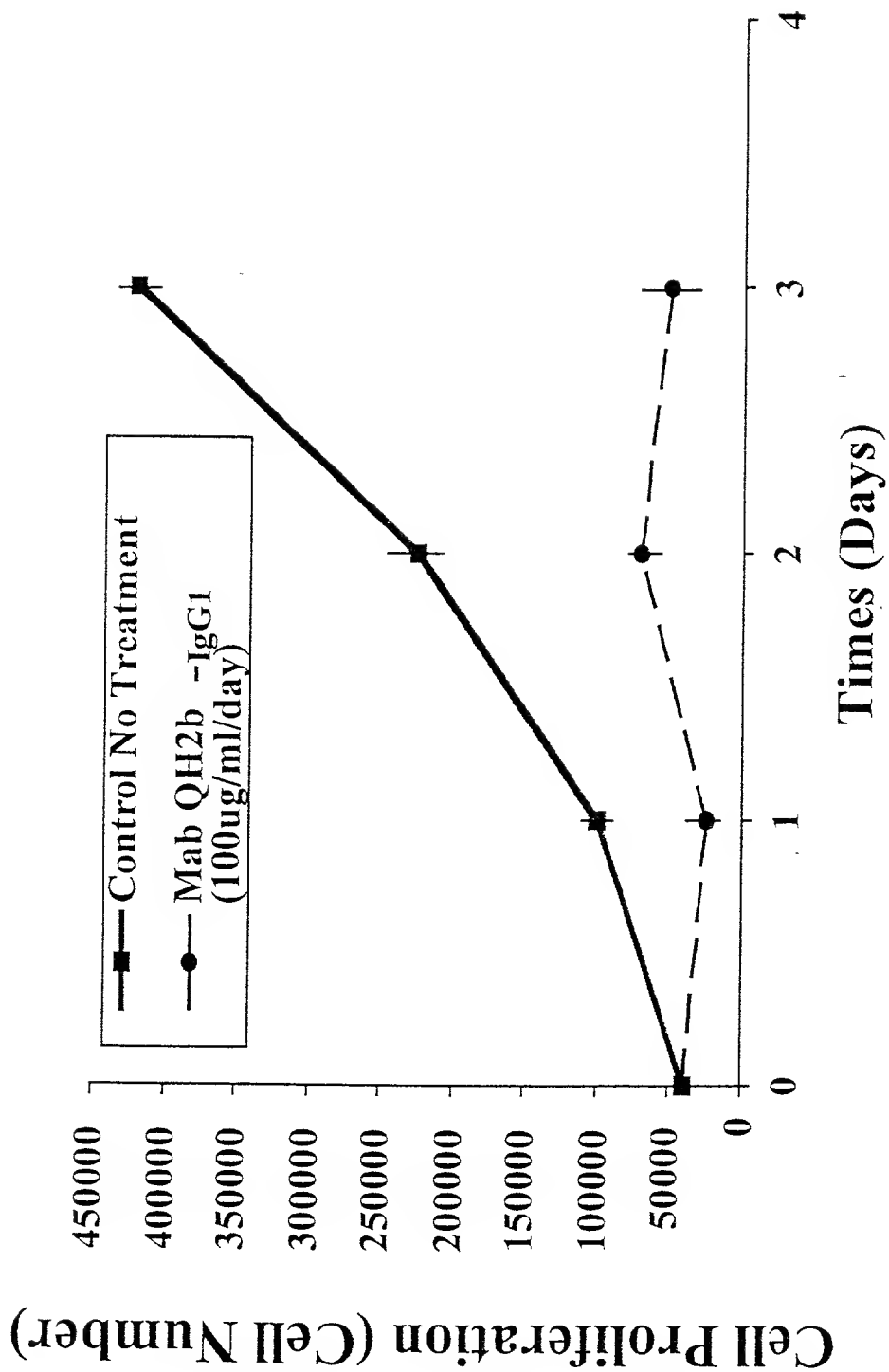


FIGURE 11